

## **TRAINING FOR THE HEALTH SECTOR**

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# **SECOND-HAND TOBACCO SMOKE AND CHILDREN**

## **Children's Health and the Environment**

WHO Training Package for the Health Sector

World Health Organization

*[www.who.int/ceh](http://www.who.int/ceh)*

*October 2011*

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*SHS: Second-hand smoke*

## **Second-hand tobacco smoke (SHS) and children**

### **OBJECTIVES**

#### **TO UNDERSTAND, RECOGNIZE, AND KNOW:**

- ❖ **Definition of second-hand tobacco smoke (SHS)**
- ❖ **Epidemiology of SHS**
- ❖ **Relevance of SHS to children's health**
- ❖ **Environmental history and diagnostics of SHS**
- ❖ **Changing behaviours of smoking**
- ❖ **Policy implications**

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The objectives of this presentation are to understand :

- The definition of second-hand tobacco smoke
- The epidemiology of second-hand tobacco smoke
- The relevance of second-hand tobacco smoke to children's health
- The environmental history and diagnostics of second-hand tobacco smoke
- Changing behaviours of smoking
- Policy implications

## Second-hand tobacco smoke (SHS) and children

### DEFINITION OF SECOND-HAND TOBACCO SMOKE

#### Second-hand tobacco smoke (SHS):

- Inhalation of tobacco smoke in the air
- 80–85% of the side stream smoke coming from burning tip of a cigarette
- Up to 10 times more burdened with toxic substances (e.g. carcinogens) than mainstream smoke

**SHS is a new technical term for what was previously called Environmental Tobacco Smoke**



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#### Refs:

•Courage CM. Environmental tobacco smoke. In: *Children's health and environment: A review of evidence - a joint report from the European Environment Agency and the WHO Regional Office for Europe*. G. Tamburlini, O. von Ehrenstein, R. Bertollini, eds. WHO Regional Office for Europe, Copenhagen, 2002

•National Research Council. Environmental Tobacco Smoke: Measuring exposures and assessing health effects. Washington DC, *National Academy Press*, 1986.

*Environmental tobacco smoke (second-hand tobacco smoke) is an aged, diluted mixture of mainstream smoke, that is smoke exhaled by smokers, and sidestream smoke, that is smoke emitted from the burning tip of the cigarette. The inhalation of Environmental Tobacco Smoke is known as 'involuntary smoking' or 'passive smoking'. More than 4000 compounds have been identified in laboratory-based studies as components of mainstream smoke and many of them known or suspected human carcinogens (NRC, 1986).*

*Image: Centers for Disease Control and Prevention (CDC) Media Campaign Resource Center. Copyright World Health Organization. Available at [www.who.int/features/2003/08/en/](http://www.who.int/features/2003/08/en/) - accessed March 2011*

*SHS: Second-hand tobacco smoke*

## Second-hand tobacco smoke (SHS) and children

### TOBACCO SMOKE – WINDOWS OF EXPOSURE

#### ❖ Prenatal exposure

- When a mother exposes her unborn child through active smoking or passive exposure via the umbilical cord

#### ❖ Passive childhood exposure

- Smoking mothers expose the child via breast-milk
- Smoking household members expose the child via indoor air

#### ❖ Active smoking

- Some teenagers are starting to smoke in the early years of life

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There are different moments in their life, when children could be particularly exposed, in different ways, to tobacco smoke.

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Second-hand smoke causes 600 000 premature deaths per year. There are more than 4000 chemicals in tobacco smoke, of which at least 250 are known to be harmful and more than 50 are known to cause cancer. Some of these chemicals can be found in other toxic mediums, such as:

- **Acetic acid:** found in vinegar
- **Ammonia:** found in detergent
- **Arsenic:** found in poison
- **Butane:** found in lighters
- **Cadmium:** found in batteries
- **Carbon monoxide:** found in exhaust gas
- **Hexamine:** found in barbecue starters
- **Methane:** found in sewer gas
- **Methanol:** found in rocket fuel
- **Nicotine:** found in insecticide
- **Paint**
- **Stearic Acid:** found in candle wax
- **Toluene:** found in industrial solvent

*Ref:*

• WHO. 10 Facts on Second-Hand Smoke, Available at:  
[www.who.int/features/factfiles/tobacco/tobacco\\_facts/en/index5.html](http://www.who.int/features/factfiles/tobacco/tobacco_facts/en/index5.html) - accessed March 2011

*Image: WHO. WHO Report on the Global Tobacco Epidemic, 2009: Implementing smoke-free environments. 2009. Available at [www.who.int/publications/2009/9789241563918\\_eng\\_full.pdf](http://www.who.int/publications/2009/9789241563918_eng_full.pdf) – accessed March 2011*

## Second-hand tobacco smoke (SHS) and children

### EXPOSURE TO TOBACCO SMOKE

#### Important factors for inhalative absorption:

- ❖ Concentration of pollutants in air
- ❖ Size of particles and content of pollutants
- ❖ Respiratory rate
- ❖ Effective pulmonary absorption
- ❖ Duration of exposure



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Certain factors determine inhalative absorption. These are:

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*Image: WHO. 10 Facts on Second-Hand Smoke. Available at [www.who.int/features/factfiles/tobacco/tobacco\\_facts/en/index5.html](http://www.who.int/features/factfiles/tobacco/tobacco_facts/en/index5.html) - accessed March 2011*

## Second-hand tobacco smoke (SHS) and children

### EXPOSURE DATA

- ❖ Smoking prevalence differs greatly between countries and in different environments (urban vs. rural, socioeconomic classes)
- ❖ Prevalence of infant passive smoking varies from 10% in Sweden to 60% in Greece, to 40% in the U.S, and to 50-70% in South East Asia.
- ❖ Number of women of reproductive age who smoke is increasing
- ❖ Regulations on smoking implemented in many countries to reduce the numbers of smokers

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•Large differences in smoking prevalence exist between countries and in different environments (urban vs. rural, socioeconomic classes, etc.) (Samet,2001)In the United States, it has been estimated that 43% of children aged 2 months to 11 years live in a home with at least one person that smokes. The prevalence of passive infant smoking was reported to be around 40% also in Europe (Samet, 2001).

•It seems that based on statistical data, the number of adult smokers in Europe is showing a decreasing trend. In addition, regulation on smoking is being implemented in Europe with the aim to reduce numbers of smokers.

•However it is also observed that the number of smoking women in reproductive age is not decreasing or is even increasing.

•Guidelines to Article 8 of the WHO Framework Convention on Tobacco Control state that there is “no safe level of exposure to tobacco smoke”. Creating 100% smoke-free environments is the only way to protect people from the harmful effects of second-hand tobacco smoke.

#### Refs.:

- Conrad A, et al. German environmental survey IV: children's exposure to environmental tobacco smoke. *Toxicology Letters*, 2010, 192(1):79-83.
- Ostrea EM Jr.,et al. An epidemiologic study comparing fetal exposure to tobacco smoke in three Southeast Asian countries. *International Journal of Occupational and Environmental Health*, 2008, 14(4):257-62.
- Samet JM, Yang G. Passive smoking, women and children. In: *Women and the Tobacco Epidemic. Challenges for the 21st Century*. Samet JM, Yoon SY, eds. WHO in collaboration with the Institute for Global Tobacco Control and the Johns Hopkins School of Public Health, Geneva, 2001. Available at [www.who.int/tobacco/media/en/WomenMonograph.pdf](http://www.who.int/tobacco/media/en/WomenMonograph.pdf) – accessed March 2011
- WHO European Centre for Environment and Health. Exposure to environmental tobacco smoke in Europe, a review. Copenhagen, WHO Regional Office for Europe, 2003 (technical report).

SHS: Second-hand tobacco smoke

## Second-hand tobacco smoke (SHS) and children

### TOBACCO USE IS A GLOBAL PROBLEM

- ❖ Worldwide there are almost 1 billion male and 250 million female smokers
- ❖ Global Youth Tobacco Survey showed that almost half of the world's children are exposed to second-hand tobacco smoke (SHS)
- ❖ Every day an estimated 82,000 to 99,000 young people start smoking
- ❖ Children are a specific target group for tobacco industry promotion

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Ref.:

•Lando HA, et al. Tobacco is a global paediatric concern. *Bulletin of the World Health Organization*, 2010, 88:2-2.

*Tobacco has major adverse consequences for children. Despite its devastating consequences, in countries facing immediate issues of poverty, lack of access to potable water and infectious diseases, tobacco is often viewed as a lower priority health threat. ... Tobacco use is a global problem; worldwide there are almost 1 billion male and 250 million female smokers. Every day an estimated 82 000 to 99 000 young people start smoking; many are children under the age of 10 and most reside in low- or middle-income countries. Globally, tobacco is marketed to children; the tobacco industry recognizes that new smokers must be recruited to replace those who quit or die from tobacco-related diseases. The Global Youth Tobacco Survey is a school-based survey conducted in 137 countries using a standard method for constructing the sample, selecting schools and classes, and processing data. Results indicate that almost half of the children who had never smoked were exposed to second-hand smoke both at home (46.8%) and outside the home (47.8%). Children are exposed to tobacco promotion and marketing at early ages; cigarette marketing and promotion are endemic throughout the world. There is strong evidence that tobacco industry imagery and advertising cause tobacco use and dependence in children.*

SHS: Second-hand tobacco smoke



## Second-hand tobacco smoke (SHS) and children

### [SMOKING TRENDS IN YOUR REGION]

❖ Xxx

❖ Xxx

❖ Xxx

❖ Xxx

❖ Xxx

<<NOTE TO USER: Please include a slide here with data on smoking trends in your particular region.>>

## Second-hand tobacco smoke (SHS) and children

### EXAMPLE: SMOKING TRENDS IN WHO EUROPEAN REGION

- ❖ 38% male smokers and an increasing gap between east and west
- ❖ 11 Member States have prevalence rates exceeding 50%
- ❖ 4 Member States have prevalence rates of less than 30%
- ❖ Nearly 23% female smokers and a narrowing east-west gap
- ❖ Smoking prevalence among young people is about 27–30%, with an upward trend generally (and a potential slight decline in the past few years, such as in Germany)
- ❖ Rising trend among adolescent girls, who have the highest incidence of smoking initiation
- ❖ Smoking in the WHO European Region still remains at a rate that could have direct and indirect devastating public health effects for Europe

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A high prevalence of smoking in the European region puts children at risk to second-hand smoke exposure.

*Refs:*

•WHO European Centre for Environment and Health. Exposure to environmental tobacco smoke in Europe, a review. WHO Regional Office for Europe, Copenhagen, 2003 (technical report).

<<NOTE TO USER: Actual data can be retrieved from the European Environment and Health Information System (EHIS) – available at [www.euro.who.int/en/what-we-do/data-and-evidence/environment-and-health-information-system-ehis](http://www.euro.who.int/en/what-we-do/data-and-evidence/environment-and-health-information-system-ehis) – March 2011>>

## Second-hand tobacco smoke (SHS) and children

# MATERNAL SMOKING AND PRENATAL EXPOSURE

### Science shows

- ↑ miscarriage, ↑ stillbirth
- ↑ preterm birth
- ↓ birth weight, birth length, head circumference
- ↑ risk of birth defects (cleft palate)
- ↑ risk of sudden infant death syndrome
- ↓ pulmonary growth
- ↑ neuro-behavioural abnormalities, ↓ Intelligence Quotient
- ↑ childhood cancer



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##### •Intelligence Quotient:

Mothers who smoke in late pregnancy risk having children with lower intelligence. Research shows that young men whose mothers smoked 20 or more cigarettes a day had Intelligence Quotients that were on average 6.2 points below those of sons of non-smokers. The risk increases with the amount of cigarettes a woman smokes. The association was as strong in children with high social status as in low status offspring.

##### •Neurobehavioral abnormalities:

A study included 5,991 children born between 1995 and 1998 as well as their parents. They measured behavioral problems using the Strength and Difficulties Questionnaire at follow-up 10 years after birth. Compared with children not exposed to tobacco smoke, children exposed both pre- and postnatally to tobacco smoke had twice the estimated risk [95% confidence interval, 1.4–3.1] of being classified as abnormal according to the total difficulties score of the Strength and Difficulties Questionnaire at 10 years of age. These results could not be explained by confounding by parental education, father's employment, child's time spent in front of computer or television screen, being a single father or mother, or mother's age.

##### •Childhood cancer:

Researchers identified more than 30 studies on the association between exposure to maternal tobacco smoke during pregnancy and cancer in childhood. We combined their results in meta-analyses based on a random effects model. The results of the meta-analyses suggest a small increase in risk of all neoplasm's [relative risk 1.10; 95% confidence interval, 1.03-1.19; based on 12 studies]. The results on exposure to paternal tobacco smoke suggest an association with brain tumours (relative risk 1.22; confidence interval, 1.05-1.40; based on 10 studies) and lymphomas (relative risk 2.08; confidence interval, 1.08-3.98; 4 studies).

#### Refs:

##### For miscarriage

•Courage CM. Environmental tobacco smoke. In: *Children's health and environment: A review of evidence. A joint report from the European Environment Agency and the WHO Regional Office for Europe*. Tamburlini G, von Ehrensteing O, Bertollini R, eds. WHO Regional Office for Europe, Copenhagen 2002. Available at [www.euro.who.int/\\_data/assets/pdf\\_file/0007/98251/E75518.pdf](http://www.euro.who.int/_data/assets/pdf_file/0007/98251/E75518.pdf) - accessed March 2011

•Tuomaa TE. The adverse effects of tobacco smoking on reproduction and health: A review from the literature. *Nutr Health*, 1995, 10:105–20.

##### For stillbirth

•Courage CM. Environmental tobacco smoke. In: *Children's health and environment: A review of evidence. A joint report from the European Environment Agency and the WHO Regional Office for Europe*. Tamburlini G, von Ehrensteing O, Bertollini R, eds. WHO Regional Office for Europe, Copenhagen 2002. Available at [www.euro.who.int/\\_data/assets/pdf\\_file/0007/98251/E75518.pdf](http://www.euro.who.int/_data/assets/pdf_file/0007/98251/E75518.pdf) - accessed March 2011

•Di Franza RJ, Lew AR. Effects of maternal cigarette smoking on pregnancy complications and sudden infant death syndrome. *Fam Pract*, 1995, 40:385-94

##### For birth weight, birth length, head circumference

•Windham GC et al. Prenatal active or passive tobacco smoke exposure and the risk of preterm delivery or low birth weight. *Epidemiology*, 2000,11:427-33.

##### For Intelligence Quotient

•Dobson R. Smoking in late pregnancy is linked to lower IQ in offspring. *British Medical Journal*, 2005, 330:499.

•Mortensen EL et al. A dose- response relationship between maternal smoking during late pregnancy and adult intelligence in male offspring. *Paediatric and Perinatal Epidemiology*, 2005, 19:4-11.

##### For neurobehavioural abnormalities

•Ruckinger S et al. Prenatal and postnatal tobacco exposure and behavioral problems in 10-year-old children: Results from the GINI-plus prospective birth cohort study. *Environmental Health Perspectives*, 2010, 118(1):150-4.

##### For childhood cancer

•Boffetta P et al. Risk of childhood cancer and adult lung cancer after childhood exposure to passive smoke: A meta-analysis. *Environmental Health Perspectives*, 2000, 108:73-82.

Image: WHO. *Gender and Tobacco*. 2010. Available at [www.who.int/features/factfiles/gender\\_tobacco/facts/en/index6.html](http://www.who.int/features/factfiles/gender_tobacco/facts/en/index6.html) - accessed March 2011.

## Second-hand tobacco smoke (SHS) and children

### FETAL BIOMETRY AND UMBILICAL FLOW VELOCITY WAVEFORMS

Prospective cohort study (Poland, 114 healthy pregnant women) – Kalinka et al, 2005

- ❖ All blood flow indices and serum cotinine (positively correlated)
  - Systolic/diastolic index
  - Resistance index
  - Pulsatility index
  - Increased resistance of umbilical blood flow
- ❖ "This could be one of the main mechanisms leading to decreased birth weight observed among infants with prenatal exposure to tobacco smoke"

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#### Ref:

•Kalinka J et al: Impact of prenatal tobacco smoke exposure, as measured by midgestation serum cotinine levels, on fetal biometry and umbilical flow. Velocity waveforms. *American Journal of Perinatology*, 2005, 22.

*The aim of this prospective cohort study was to evaluate the impact of tobacco smoke exposure, measured by maternal serum concentration of cotinine, on fetal midgestation biometric parameters and umbilical artery (UA) qualitative blood flow indices. The study population consisted of 114 healthy women in 20 to 24 weeks gestation who were recruited from the patients of two antenatal care units in Lodz, Poland. Significant negative correlation was found between fetal biparietal diameter (BPD) and serum cotinine concentration. Serum cotinine positively correlated with all blood flow indices under study (systolic/diastolic index [S/D], resistance index, and pulsatility index) after controlling for gestational age, gender, and femur length. The midgestation UA S/D ratio > 3 was found to be a significant risk factor for decreased birthweight. Tobacco smoke exposure is a significant factor inducing increased resistance of umbilical blood flow as measured in 20 to 24 weeks gestation. This could be one of the main mechanisms leading to decreased birthweight observed among infants with prenatal exposure to tobacco smoke.*

## Second-hand tobacco smoke (SHS) and children

### MATERNAL SMOKING

#### More smoke less baby

In 19 studies there was a consistent slight effect of second-hand tobacco smoke exposure on birth weight— pooled weight decrement of 31g (95% confidence interval (-42,-20))

Increased risk (about 20%) intrauterine growth restriction led to smaller birth weight than expected based on pregnancy duration



Venezuela Ministry of Health and PAHO/WHO

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#### Refs:

- Office of Environmental Health Hazard Assessment. Health effects of exposure to environmental tobacco smoke. California Environmental Protection Agency, San Francisco 1997. Available at [oehha.ca.gov/air/environmental\\_tobacco/finalets.html](http://oehha.ca.gov/air/environmental_tobacco/finalets.html) – accessed March 2011.
- Windham GC et al. Prenatal active or passive tobacco smoke exposure and the risk of preterm delivery or low birth weight. *Epidemiology*, 2000, 11:427-33.

*Image: Rights to this image are owned by Venezuela Ministry of Health and PAHO/WHO.*

## Second-hand tobacco smoke (SHS) and children

### POSTNATAL EXPOSURE



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Image: WHO. 10 Facts on Gender and Tobacco.  
[www.who.int/features/factfiles/gender\\_tobacco/facts/en/index8.html](http://www.who.int/features/factfiles/gender_tobacco/facts/en/index8.html)

## Second-hand tobacco smoke (SHS) and children

### SMOKING PARENTS

#### Science shows:

- ↑ 94% sudden infant death syndrome
- ↑ 60% acute respiratory illnesses
- ↑ 24 – 40% chronic respiratory symptoms
- ↑ 21% asthma and exacerbation of asthma symptoms
- ↓ growth in lung functioning
- ↑ 50% recurrent otitis media (repeated ear infection)
- ↑ 60-100 % cleft palate
- ↑ neuro-behavioral deficits
- ↑ neurodevelopmental deficits
- ↑ childhood cancer

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##### Refs:

##### For sudden death syndrome

•Anderson HR, Cook DG. Passive smoking and sudden infant death syndrome: review of the epidemiological evidence. *Thorax*, 1997, 52(11):1003-9.

##### For acute respiratory illnesses

•Strachan DP, Cook DG. Parental smoking and lower respiratory illness in infancy and early childhood. *Thorax*, 1997, 52(10):905-14.

##### For chronic respiratory symptoms; asthma exacerbation

•Cook DG, Strachan DP. Health effects of passive smoking 3. Parental smoking and prevalence of respiratory symptoms and asthma in school age children. *Thorax*, 1997, 52(12):1081-94.

##### For lung function

•Surgeon General 1986 US Department of Health and Human Services. The health consequences of involuntary smoking. A Report of the Surgeon General. US Government Printing Office, Washington, DC. 1986.

##### For otitis media

•Strachan DP, Cook DG. Parental smoking, middle ear disease and adenotonsillectomy in children. *Thorax*, 1998, 53:50-6.

##### For cleft palate

•Khouri MJ, et al. Does maternal cigarette smoking during pregnancy cause cleft lip and palate in offspring? *American Journal of Diseases of Children*, 1989, 143(3):333-7.

•Lammer EJ et al. Maternal smoking, genetic variation of glutathione s-transferases, and risk for orofacial clefts. *Epidemiology*, 2005, 16(5):698-701.

*We investigated in 423 infants with an isolated cleft and 294 controls whether risk is greater among offspring who lack the genetic capacity to produce glutathione S-transferase enzymes relevant to detoxification of chemicals in cigarette smoke. RESULTS: If a mother smoked during pregnancy and her fetus was homozygous null for GSTT1, the risk of isolated cleft lip with or without cleft palate was tripled odds ratio = 2.9; For fetuses who were homozygous null for GSTM1 and whose mothers smoked >=20 cigarettes / day, a 7-fold increased risk. Combined absence of GSTM1 and GSTT1 enzymes among the offspring of smoking mothers was associated with a nearly 6-fold increased risk for cleft lip. CONCLUSIONS: Maternal smoking during pregnancy increases risks for clefts among fetuses lacking enzymes involved in the detoxification of tobacco-derived chemicals.*

•Li Z et al. Maternal passive smoking and risk of cleft lip with or without cleft palate. *Epidemiology*, 2010, 21(2):240-2.

##### For neuro-behavioral deficits and childhood Cancer

•Eskenazi B, Trupin LS. Passive and active maternal smoking during pregnancy, as measured by serum cotinine, and postnatal smoke exposure. II. Effects on neurodevelopment at age 5 years. *American Journal of Epidemiology*, 1995, 142(9Suppl):S19-29.

•McCartney JS, et al. Central auditory processing in school-age children prenatally exposed to cigarette smoke. *Neurotoxicology and Teratology*, 1994, 16(3):269-276  
*Studies on behavioural and neuro-developmental deficits in children exposed to second-hand tobacco smoke are difficult to interpret influence of uncontrolled (parental intelligence, home environment, environmental and personal exposures, child rearing practices, depression, other characteristics of smokers) imprecision in measurement of smoking exposure.*

## Second-hand tobacco smoke (SHS) and children

### SMOKING PARENTS – SUDDEN INFANT DEATH SYNDROME

- ❖ Sudden infant death syndrome is the sudden, unexpected death of an infant without any evidence of a fatal illness at autopsy
- ❖ Postulated mechanisms in relation to exposure to second-hand tobacco smoke (SHS):
  - SHS directly irritates the airways and can cause respiratory infection
  - Nicotine exposure from SHS alters the infant's
    - ✓ response to hypoxia (abnormal control of cardiorespiratory activity)
    - ✓ catecholamine metabolism

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Sudden infant death syndrome is defined as a sudden, unexpected death of an infant, without evidence of any fatal illness at autopsy. After congenital anomalies, sudden infant death syndrome is the most common cause of death among infants 1 month to 1 year old in the US, accounting for 5 417 deaths in 1990. Active maternal smoking during pregnancy is an established risk factor for sudden infant death syndrome.

Role of paternal smoking – elevated risk of sudden infant death syndrome while accounting for maternal smoking in 3 out of 6 studies.

California Environmental Protection Agency (1997) states that current studies support an elevated risk of sudden infant death syndrome associated with postnatal second-hand tobacco smoke (SHS) exposure, independent of maternal smoking during pregnancy.

Postulated mechanisms in relation to second-hand tobacco smoke exposure:

- Second-hand tobacco smoke promotes direct irritation of the airways and respiratory infection
- Exposure to nicotine may alter infant's response to hypoxia (abnormal control of cardio-respiratory activity)
- Exposure to nicotine may alter infant's catecholamine metabolism (catecholamines act as hormones or neuro-transmitters)

#### Refs:

- Blair PS et al. Smoking and the sudden infant death syndrome: results from 1993-5 case-control study for Confidential Inquiry into Stillbirths and Deaths in Infancy. *British Medical Journal*, 1996, 313:195-198.
- Klonoff-Cohen HS, Edelstein SL. A case-control study of routine and death scene sleep position and sudden infant death syndrome in southern California. *Journal of the American Medical Association*, 1995, 273:790-794.
- Nicholl J, O'Cathain A. Antenatal Smoking, postnatal passive smoking and sudden infant death syndrome. In: *Effects of smoking on the fetus, neonate and child*. Poswillo D, Alberman E, eds. Oxford University Press, 1992, 138-49.
- Office of Environmental Health Hazard Assessment. Health effects of exposure to environmental tobacco smoke. California Environmental Protection Agency, San Francisco 1997. Available at [oehha.ca.gov/air/environmental\\_tobacco/finalets.html](http://oehha.ca.gov/air/environmental_tobacco/finalets.html) – accessed March 2011.
- Slotkin TA et al. Nicotine attenuates the ventilatory response to hypoxia in the developing lamb. *Pediatric Research*, 1995, 37(5):652-660.



## Second-hand tobacco smoke (SHS) and children

### MATERNAL SMOKING – SUDDEN INFANT DEATH SYNDROME

Prenatal and postnatal maternal smoking and risk of sudden infant death syndrome (meta-analysis of 39 studies)

Exposure to second-hand tobacco smoke	Pooled odds ratio	95% confidence interval
Prenatal maternal smoking (unadjusted)	2.77	2.45 - 3.13
Prenatal maternal smoking (adjusted)	2.08	1.83 - 2.38
Postnatal maternal smoking (after controlling for prenatal smoking)	1.94	1.55 - 2.43

Most studies found dose-response relationships with both prenatal and postnatal maternal smoking.

Based on: Anderson HR, Cook DG, 1997 17

A meta-analysis of 39 studies looked at prenatal and postnatal maternal smoking and risk of sudden infant death syndrome. Most studies found dose-response relationships with both prenatal and postnatal maternal smoking. Studies controlled for maternal factors (age, parity); infant factors (sex, birth weight, gestational age), socioeconomic status (ethnicity, social class, education) and infant care practices (breastfeeding, sleeping position, wrapping), prenatal maternal smoking (4 studies).

*Table based on: Anderson HR, Cook DG. Passive smoking and sudden infant death syndrome: review of the epidemiological evidence. Thorax, 1997, 52(11):1003-9.*

## Second-hand tobacco smoke (SHS) and children

### TOBACCO SMOKE – CHILDREN'S LUNGS

- ❖ In early childhood (up to 3 years) lung development continues with the formation of alveoli
- ❖ Growth in lung function parallels the change in height throughout childhood
- ❖ Second-hand tobacco smoke (SHS) increases the risk of respiratory infections, which may adversely affect lung functioning
- ❖ *In utero* exposure to maternal smoking may have lasting effects on the airways of the lung
- ❖ Lung functioning declines with active smoking among older children

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- In early childhood (up to 3 years) lung development is completed with the formation of alveoli.
- Growth in lung function parallels the change in height throughout childhood.
- Second-hand tobacco smoke (SHS) increases the risk of respiratory infections, which may adversely affect lung functioning.
- *In utero* exposure to maternal smoking may have lasting effects on the airways of the lung.
- Lung functioning declines with active smoking among older children.

#### Refs:

- Office of Environmental Health Hazard Assessment. Health effects of exposure to environmental tobacco smoke. California Environmental Protection Agency, San Francisco 1997. Available at [oehha.ca.gov/air/environmental\\_tobacco/finalets.html](http://oehha.ca.gov/air/environmental_tobacco/finalets.html) – accessed March 2011.
- Surgeon General 1986 US Department of Health and Human Services. The health consequences of involuntary smoking. A Report of the Surgeon General. US Government Printing Office, Washington, DC. 1986.
- US Environmental Protection Agency. Respiratory health effects of passive smoking: lung cancer and other disorders. US Government Printing Office, Washington, DC, EPA/600/006F, 1992.

## Second-hand tobacco smoke (SHS) and children

### SMOKING PARENTS – RESPIRATORY SYMPTOMS IN CHILDREN

- ❖ First reports of an effect of parental smoking on children's respiratory symptoms published in the early 1970s !
- ❖ Risk if either parent smokes (meta-analysis of 60 studies)

Respiratory symptoms	Number of studies	Odds ratio	95% confidence interval
Wheezing	41	1.24	1.17 - 1.31
Cough	34	1.40	1.27 - 1.53
Phlegm	7	1.35	1.13 - 1.62
Breathlessness	6	1.31	1.08 - 1.59

Based on: Cook DG, Strachan DP, 1997

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Studies show measures of effect are lower for one parent smoking and higher for both parents smoking. The effect of maternal smoking is stronger than paternal smoking. This can be due to a higher exposure of the child to maternal rather than to paternal smoking. This is because mothers are often at home more or because the mother also smoked in pregnancy. Because of these factors, the effect found could be due to prenatal exposure rather than to exposure during childhood.

The increased risk found in households where the father but not the mother smoked supports an effect of second-hand tobacco smoke exposure independent of *in utero* exposure.

#### Refs:

•Office of Environmental Health Hazard Assessment. Health effects of exposure to environmental tobacco smoke. California Environmental Protection Agency, San Francisco 1997. Available at [oehha.ca.gov/air/environmental\\_tobacco/finalets.html](http://oehha.ca.gov/air/environmental_tobacco/finalets.html) – accessed March 2011.

*There is sufficient evidence that Environmental Tobacco Smoke exposure at home is causally associated with chronic respiratory symptoms (cough, phlegm or wheezing) in children, particularly infants and young children. (California Environmental Protection Agency).*

•Lammer EJ et al. Maternal smoking, genetic variation of glutathione s-transferases, and risk for orofacial clefts. *Epidemiology*, 2005, 16(5):698-701.

*Table based on: Cook DG, Strachan DP. Parental smoking and prevalence of respiratory symptoms and asthma in school age children, Thorax, 1997, 52(12):1081-94.*

## Second-hand tobacco smoke (SHS) and children

### LUNG FUNCTIONING

8706 schoolchildren (6–18 years) followed annually: small reductions in lung functioning through adolescence associated with both current and preschool exposure to maternal smoking (Wang, 1994)

Spirometry parameter	Decrement ml/year	95% confidence interval
FEV <sub>1</sub>	- 3.8	- 6.4 to -1.2
FVC	- 2.8	- 5.5 to 0
FEF <sub>25 - 75</sub>	- 14.3	- 29.0 to - 0.3

❖ **Maternal smoking is a stronger determinant of lung functioning than the smoking of the father or other household members**

- Exposure *in utero*?
- Closer contact of the child with the mother?

❖ **Second-hand tobacco smoke more strongly affected FEV<sub>1</sub> among boys than girls**

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In this study, 8706 schoolchildren (6–18 years) were followed annually. Researchers found small reductions in lung functioning through adolescence were associated with both current and preschool exposure to maternal smoking.

Maternal smoking is a stronger determinant of lung functioning than the smoking of the father or other household members. This could be explained by:

- Exposure *in utero*
- Closer contact of the child with the mother

Second-hand tobacco smoke (SHS) more strongly affected FEV<sub>1</sub> among boys than girls.

*FEV<sub>1</sub>, FVC and FEF<sub>25-75</sub> are lung function parameters. FEV<sub>1</sub> is the Forced Expiratory Volume in the first second, an important measure of pulmonary function. FVC is the Forced Vital Capacity, the amount of air exhaled from the lungs after taking the deepest breath possible. FEF<sub>25-75</sub>, Forced Expiratory Flow Between 25% and 75% of Forced Vital Capacity.*

Ref:

- Wang X et al. A longitudinal study of the effects of parental smoking on pulmonary function in children 6-18 years. *American Journal of Respiratory and Critical Care Medicine*, 1994, 149(6):1420-5 .

## Second-hand tobacco smoke (SHS) and children

### SMOKING PARENTS – ASTHMA IN CHILDREN

- ❖ ↑ 21% clinically diagnosed asthma either parent being a smoker
- ❖ Developing asthma or wheezing is more related to maternal than paternal smoking
- ❖ Effect was stronger for the first 5–7 years of life than for school age



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Research results on smoking parents and relation to asthma in children include:

- ↑ 21% clinically diagnosed asthma when either parent being a smoker

Meta-analysis (37 studies): Clinically diagnosed asthma: odds ratio = 1.44 (95% confidence interval (1.27-1.64))

- Developing asthma or wheezing is more related to maternal than paternal smoking.

Meta-analysis (25 studies): The pooled odds ratio for either parent smoking: odds ratio = 1.21 (95% confidence interval (1.1-1.34))

Effect was stronger for the first 5–7 years of life than for school age

Incidence of asthma or wheezing was related to maternal smoking.

Second hand tobacco smoke increases airway hyper responsiveness.

#### Refs:

- Gergen PJ. Environmental tobacco smoke as a risk factor for respiratory disease in children. *Respiratory Physiology and Neurobiology*, 2001, 128(1):39-46.

Likewise exposure to second hand tobacco smoke is not associated with increase in IgE in children.

- Kulig M et al. Effect of pre- and postnatal tobacco smoke exposure on specific sensitization to food and inhalant allergens during the first 3 years of life. Multicenter Allergy Study Group, Germany. *Allergy*, 1999, 54(3):220-228.

- Martinez FD et al. Asthma and wheezing in the first six years of life. The Group Health Medical Associates. *New England Journal of Medicine*, 1995, 332(3):133-138.

While exposure to second hand tobacco smoke increases the risk of sensitization to food allergens in the first few years of life, it does not appear to increase the sensitivity to inhalant allergens.

- Strachan DP, Cook DG. Health effects of passive smoking .5. Parental smoking and allergic sensitisation in children. *Thorax*, 1998, 53(2):117-123.

Image: WHO/Marko Kokic. *Asthma*. 2006.

## Second-hand tobacco smoke (SHS) and children

### SMOKING PARENTS – PROGNOSIS OF ASTHMA

#### Disease severity increased, as assessed by:

- Frequency and intensity of asthma attacks
- Number of emergency room visits during a year
- Use of asthma medication
- Occurrence of severe asthma attacks (requiring intubation)



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22

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#### Refs:

- Cook DG, Strachan DP, Carey IM. Health effects of passive smoking: 9. Parental smoking and spirometric indices in children. *Thorax*, 1998, 53(10):884-93.
- Jaakkola JJ, Jaakkola MS. Effects of environmental tobacco smoke on the respiratory health of children. *Scandinavian Journal of Work, Environment, and Health*, 2002, 28(suppl 2):71-83.
- Office of Environmental Health Hazard Assessment. Health effects of exposure to environmental tobacco smoke. California Environmental Protection Agency, San Francisco 1997. Available at [oehha.ca.gov/air/environmental\\_tobacco/finalets.html](http://oehha.ca.gov/air/environmental_tobacco/finalets.html) – accessed March 2011.

Image: WHO. 10 facts on the tobacco epidemic and global tobacco control. Available at: [www.who.int/features/factfiles/tobacco\\_epidemic/tobacco\\_epidemic\\_facts/en/index5.html](http://www.who.int/features/factfiles/tobacco_epidemic/tobacco_epidemic_facts/en/index5.html) - accessed March 2011

## Second-hand tobacco smoke (SHS) and children

### ACUTE RESPIRATORY ILLNESSES

- ❖ Second-hand tobacco smoke (SHS) may increase the severity of acute respiratory illnesses by irritating and inflaming the lungs
- ❖ SHS particles are small and can penetrate the airways and alveoli of the lung
- ❖ Gaseous components of SHS may adversely affect lung defences, with effects on:
  - Cilia
  - Macrophage function
  - Immune response

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- Second-hand tobacco smoke (SHS) may increase the severity of acute respiratory illnesses by irritating and inflaming the lungs.
- Second-hand tobacco smoke particles are small and can penetrate the airways and alveoli of the lung.
- The gaseous components of second-hand tobacco smoke may adversely affect lung defences, with effects on cilia, macrophage function, immune response.

#### *Refs:*

- Scientific Committee on Tobacco and Health, HMSO. Report of the Scientific Committee on Tobacco and Health. Stationery Office, London, 1998.
- Surgeon General 1986 US Department of Health and Human Services. The health consequences of involuntary smoking. A Report of the Surgeon General. US Government Printing Office, Washington, DC. 1986.
- US Environmental Protection Agency. Respiratory health effects of passive smoking: lung cancer and other disorders. US Government Printing Office, Washington, DC, EPA/600/006F, 1992.

## Second-hand tobacco smoke (SHS) and children

### ACUTE RESPIRATORY ILLNESSES

- ❖ Each year: 150,000 to 200,000 cases of lower respiratory tract illness related to second-hand tobacco smoke (SHS) in children younger than 18 months in the US, about 5% of which require hospitalization
- ❖ Results of epidemiological studies
  - 60% increase if either parent smokes
  - 70% increase if only the mother smokes
  - 30% increase if another household member smokes

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- Risk of acute respiratory illness from second-hand tobacco smoke (SHS) is highest in the first year of life, and remains elevated until about the age of 3 years.
- Direct effects of second-hand tobacco smoke exposure on the risk of acute respiratory illness in young children's, independent of *in utero* exposure to second-hand tobacco smoke.
- The effects of second-hand tobacco smoke on the susceptibility to infections can be protected, at least to some extent, by breastfeeding the child for a lengthy period.
- A meta-analysis (36 studies) showed the following associations between parental smoking and acute respiratory illness:
  - For either parent smoking: odds ratio = 1.6 (95% confidence interval (1.4 – 1.7))
  - For maternal smoking only: odds ratio = 1.7 (95% CI (1.6 – 1.9))
  - For other household member smoking: odds ratio = 1.3 (95% confidence interval (1.2 – 1.4))

#### Refs:

- Strachan DP, Cook DG. Health effects of passive smoking. 1. Parental smoking and lower respiratory illness in infancy and early childhood. *Thorax*, 1997, 52(10):905-914.
- Scientific Committee on Tobacco and Health, HMSO. Report of the Scientific Committee on Tobacco and Health. Stationery Office, London, 1998.
- Surgeon General 1986 US Department of Health and Human Services. The health consequences of involuntary smoking. A Report of the Surgeon General. US Government Printing Office, Washington, DC. 1986.
- US Environmental Protection Agency. Respiratory health effects of passive smoking: lung cancer and other disorders. US Government Printing Office, Washington, DC, EPA/600/006F, 1992.



## Second-hand tobacco smoke (SHS) and children

### ACUTE AND CHRONIC MIDDLE EAR DISEASE

- ❖ Eustachian tube dysfunction is central to the development of middle ear disease
- ❖ Second-hand tobacco smoke (SHS) may contribute to Eustachian tube dysfunction through
  - ↓ Mucociliary clearance
  - ↑ Adenoidal hyperplasia
  - ↑ Mucosal swelling
  - ↑ Frequency of upper respiratory tract infections
- ❖ Parental smoking is linked with middle ear disease among children and is likely to be a cause

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Second-hand tobacco smoke (SHS) may contribute to Eustachian tube dysfunction through:

- ↓ mucociliary clearance
- ↑ adenoidal hyperplasia
- ↑ mucosal swelling
- ↑ frequency of upper respiratory tract infections

#### *Refs:*

- Heinrich J. Nonallergic respiratory morbidity improved along with a decline of traditional air pollution levels: a review. *European Respiratory Journal Suppl*, 2003, 40:64s-69s.
- Scientific Committee on Tobacco and Health, HMSO. Report of the Scientific Committee on Tobacco and Health. Stationery Office, London, 1998.

## Second-hand tobacco smoke (SHS) and children

### SMOKING PARENTS – NEURO-BEHAVIORAL AND NEURODEVELOPMENTAL DEFICITS

- ❖ Biological plausibility of exposure to second-hand tobacco smoke (SHS) causing adverse neurodevelopmental effects
  - SHS may be potentially more hazardous than *in utero* exposure to maternal smoking
  - Inhalation exposure provides a higher dose than transplacental exposure
- ❖ Childhood may be the critical period for neurodevelopmental effects of exposure to SHS
- ❖ Children have a longer duration of exposure than do fetuses
- ❖ In animal experiments, brain development is altered by postnatal but not prenatal exposure to SHS

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Ref:

•Eskenazi B, Castorina, R. Association of prenatal maternal or postnatal child environmental tobacco smoke exposure and neurodevelopmental and behavioral problems in children. *Environmental Health Perspectives*, 1999, 107(12):991-1000.

SHS: Second-hand tobacco smoke

## Second-hand tobacco smoke (SHS) and children

### NEURODEVELOPMENT - WHAT STUDIES SHOW

- ❖ Decreased academic performance in relation to paternal, maternal, or household smoking reported at the time of a follow-up during childhood
- ❖ Decreased performance on a range of cognitive, perceptual, central auditory and linguistic abilities in association with postnatal exposure in 3 of 6 studies controlled for prenatal maternal smoking
- ❖ Decreased cognitive abilities (reading and math) among children aged 6-16 if exposed to second-hand tobacco smoke (SHS)
- ❖ Increased hyperactive behavior
- ❖ 100% increase in behavioral problems at the age of 10 in children exposed both pre- and post-natally

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Studies showing decreased academic performance in connection to second-hand tobacco smoke (SHS) include: Rantakallio, 1983; Bauman, 1989; Byrd, 1994.

Only one study (Rantakallio, 1983) controlled for maternal smoking during pregnancy.

Decreased cognitive performance studies include: Bauman, 1991; Eskenazi, 1995; Fried, 1997.

Children of mothers who smoked only after pregnancy performed less well than children of mothers who smoked only during pregnancy (Bauman, 1989; Eskenazi, 1995).

#### Refs:

- Bauman KE et al. Family cigarette smoking and test performance by adolescents. *Health Psychology*, 1989, 8(1):97-105.
- Bauman KE et al. Parental cigarette smoking and cognitive performance of children. *Health Psychology*, 1991, 10(4):282-288.
- Byrd RS, Weitzman ML. Predictors of early grade retention among children in the United States. *Pediatrics*, 1994, 93(3):481-487.
- Eskenazi B Castorina R. Association of prenatal maternal or postnatal child environmental tobacco smoke exposure and neurodevelopmental and behavioral problems in children. *Environmental Health Perspectives*, 1999, 107(12):991-1000.
- Eskenazi B et al. Passive and active maternal smoking as measured by cotinine; the effect on birth weight. *American Journal of Public Health*, 1995, 85(3):395-8.
- Fried PA, et al. Reading and language in 9- to 12- year olds prenatally exposed to cigarettes and marijuana. *Neurotoxicology and Teratology*, 1997, 19(3):171-83.
- Rantakallio P. A follow-up study up to the age of 14 of children whose mothers smoked during pregnancy. *Acta Paediatrica*, 1983, 72(5):747-753.

▪Ruckinger S et al. Prenatal and postnatal tobacco exposure and behavioral problems in 10-year-old children: Results from the GINI-plus prospective birth cohort study. *Environmental Health Perspectives*, 2010, 118(1):150-4.

Sample included 5,991 children born between 1995 and 1998 as well as their parents. They measured behavioral problems using the Strength and Difficulties Questionnaire (Strength and Difficulties Questionnaire) at follow-up 10 years after birth. Compared with children not exposed to tobacco smoke, children exposed both pre- and postnatally to tobacco smoke had twice the estimated risk [95% confidence interval (confidence interval), 1.4–3.1] of being classified as abnormal according to the total difficulties score of the Strength and Difficulties Questionnaire at 10 years of age. These results could not be explained by confounding by parental education, father's employment, child's time spent in front of computer or television screen, being a single father or mother, or mother's age.

•Twardella D et al. Exposure to secondhand tobacco smoke and child behaviour - results from a cross-sectional study among preschool children in Bavaria. *Acta Paediatrica*, 2010, 99(1):106-11.

•Yolton K, et al. Exposure to environmental tobacco smoke and cognitive abilities among U.S. children and adolescents. *Environmental Health Perspectives*, 2005, 113(1):98–103.

Children aged 6 to 16 showed reduced cognitive abilities in an inverse association with SHS exposure.

## Second-hand tobacco smoke (SHS) and children

### NEURO-BEHAVIORAL PROBLEMS

- ❖ 150% increase in attention deficit hyperactivity disorder
- ❖ 100% increase in behavioral problems doubled at the age of 10 in children



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#### Refs:

•Braun JM, et al. Exposures to environmental toxicants and attention deficit hyperactivity disorder in U.S. children. *Environmental Health Perspectives*, 2006, 114(12):1904-9.

Data were obtained from the National Health and Nutrition Examination Survey 1999–2002. Of 4,704 children 4–15 years of age, 4.2% were reported to have attention deficit hyperactivity disorder and stimulant medication use, equivalent to 1.8 million children in the United States. In multivariable analysis, prenatal tobacco exposure [odds ratio = 2.5; 95% confidence interval (confidence interval), 1.2–5.2] were significantly associated with attention deficit hyperactivity disorder. Postnatal tobacco smoke exposure was not associated with attention deficit hyperactivity disorder (odds ratio = 0.6; 95% confidence interval, 0.3–1.3;  $p = 0.22$ ). If causally linked, these data suggest that prenatal tobacco exposure accounts for 270,000 excess cases of attention deficit hyperactivity disorder in U.S. children.

•Froehlich TE et al. National Health and Nutrition Examination Survey . Children age 8 to15. Association of tobacco and lead exposures with attention-deficit/hyperactivity disorder. *Pediatrics*, 2009, 124(6):1054-63.

Prenatal tobacco exposure (adjusted odds ratio [aOR]: 2.4 [95% confidence interval: 1.5–3.7])

•Ruckinger S et al. Prenatal and postnatal tobacco exposure and behavioral problems in 10-year-old children: Results from the GINI-plus prospective birth cohort study. *Environmental Health Perspectives*, 2010, 118(1):150-4.

Sample included 5,991 children born between 1995 and 1998 as well as their parents. They measured behavioral problems using the Strength and Difficulties Questionnaire at follow-up 10 years after birth. Compared with children not exposed to tobacco smoke, children exposed both pre- and postnatally to tobacco smoke had twice the estimated risk [95% confidence interval (confidence interval), 1.4–3.1] of being classified as abnormal according to the total difficulties score of the Strength and Difficulties Questionnaire at 10 years of age. These results could not be explained by confounding by parental education, father's employment, child's time spent in front of computer or television screen, being a single father or mother, or mother's age.

Image: WHO. Influenza Illustration South Africa.

## Second-hand tobacco smoke (SHS) and children

### PARENTAL SMOKING – CHILDHOOD CANCER

#### ❖ Paternal tobacco smoke

- 22% increase in the risk of brain tumour
- 200% increase in the risk of lymphoma
- 280% increase in the risk of acute myeloid leukemia, 32% increase in the risk of acute lymphoblastic leukemia
- Results on exposure to tobacco smoke from maternal smoking before or after pregnancy are too sparse to allow for conclusion

#### ❖ Brain tumours among the children of non-smoking women exposed to tobacco smoke from the husband's smoking:

- 80% increase for early pregnancy exposure
- 70% increase for late pregnancy

Chang JS, et al.

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Paternal tobacco smoke has been linked to increases in:

- brain tumors (10 studies): relative risk = 1.22 (95% confidence interval (1.05-1.40))
- lymphomas (4 studies): relative risk = 2.08 (95% confidence interval (1.08-3.98))

Brain tumours among children of non-smoking women exposed to tobacco smoke from the husband's smoking:

- during early pregnancy: relative risk = 1.8 (95% confidence interval (1.2-2.5))
- during late pregnancy: relative risk = 1.7 (95% confidence interval (1.2-2.6))

#### Refs:

•Boffetta P et al. Risk of childhood cancer and adult lung cancer after childhood exposure to passive smoke: A meta-analysis. *Environmental Health Perspectives*, 2000, 108:73-82.

More than 30 studies on the association between exposure to maternal tobacco smoke during pregnancy and cancer in childhood were identified. The results of the meta-analyses suggest a small increase in risk of all neoplasms [relative risk 1.10; 95% confidence interval, 1.03-1.19; based on 12 studies] ... The results on exposure to paternal tobacco smoke suggest an association with brain tumours (relative risk 1.22; confidence interval, 1.05-1.40; based on 10 studies) and lymphomas (relative risk 2.08; confidence interval, 1.08-3.98; 4 studies).

•Chang JS et al. Parental smoking and the risk of childhood leukemia. *American Journal of Epidemiology*, 2006, 163 (12): 1091-1100. .  
Parental smoking and the risk of childhood leukemia were examined in the North California, a case-control study, in 1995 – 2002 in 327 acute childhood leukemia cases (281 ALL, 46 AML) and 416 controls.

Maternal smoking was not associated with an increased risk of either acute lymphoblastic leukemia or acute myeloid leukemia.

Paternal preconception smoking was significantly associated with acute myeloid leukemia (odds ratio = 3.84, 95% confidence interval: 1.04, 14.17); an increased risk for acute lymphoblastic leukemia was suggestive for paternal preconception smoking (odds ratio = 1.32, 95% confidence interval: 0.86, 2.04). Greater risks of acute lymphoblastic leukemia were observed compared with the risk associated with paternal preconception smoking alone, when paternal preconception smoking was combined with maternal postnatal smoking ( $p_{\text{interaction}} = 0.004$ ) or postnatal passive smoking exposure ( $p_{\text{interaction}} = 0.004$ ).

These results strongly suggest that exposure to paternal preconception smoking alone or in combination with postnatal passive smoking may be important in the risk of childhood leukemia.

## Second-hand tobacco smoke (SHS) and children

### CARCINOGEN IN URINE OF INFANTS FROM SHS

- ❖ Biomarkers of carcinogen uptake may prove second-hand tobacco smoke (SHS)
- ❖ 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol and its glucuronides (total NNAL), a tobacco carcinogen, measured in the urine of 144 infants exposed to SHS.
- ❖ Total NNAL detectable in 67 of 144 infants (46.5%). N° of cigarettes smoked / week in the home or car by family members when the infant was present was significantly higher ( $P < 0.0001$ ) when NNAL was detected than when it was not ( $76.0 \pm 88.1$  versus  $27.1 \pm 38.2$ ).
- ❖ Substantial uptake of NNAL in infants exposed to SHS, supports concept that persistent SHS smoke exposure in childhood could be related to cancer later in life

30

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##### Ref:

•Hecht et al. 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol and its glucuronides in the urine of infants exposed to environmental tobacco smoke. *Cancer Epidemiology Biomarkers*, 2006, 15(5):988-92.

*Biomarkers of carcinogen uptake could provide important information pertinent to the question of exposure to environmental tobacco smoke in childhood and cancer development later in life. Previous studies have focused on exposures before birth and during childhood, but carcinogen uptake from environmental tobacco smoke in infants has not been reported. Exposures in infants could be higher than in children or adults because of their proximity to parents who smoke. Therefore, we quantified 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol and its glucuronides (total NNAL) in the urine of 144 infants, ages 3 to 12 months, who lived in homes with parents who smoked. Total NNAL is an accepted biomarker of uptake of the tobacco-specific carcinogen 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone. Cotinine and its glucuronide (total cotinine) and nicotine and its glucuronide (total nicotine) were also quantified. Total NNAL was detectable in 67 of 144 infants (46.5%). Mean levels of total NNAL in the 144 infants were  $0.083 \pm 0.200$  pmol/mL, whereas those of total cotinine and total nicotine were  $0.133 \pm 0.190$  and  $0.069 \pm 0.102$  nmol/mL, respectively. The number of cigarettes smoked per week in the home or car by any family member when the infant was present was significantly higher ( $P < 0.0001$ ) when NNAL was detected than when it was not ( $76.0 \pm 88.1$  versus  $27.1 \pm 38.2$ ). The mean level of NNAL detected in the urine of these infants was higher than in most other field studies of Environmental Tobacco Smoke exposure. The results of this study show substantial uptake of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone in infants exposed to Environmental Tobacco Smoke and support the concept that persistent Environmental Tobacco Smoke exposure in childhood could be related to cancer later in life.*

SHS: Second-hand tobacco smoke

## Second-hand tobacco smoke (SHS) and children

### SMOKING AND BREASTFEEDING

- ❖ Smoking should be avoided during breastfeeding
- ❖ A breastfeeding woman who does smoke should try continuously to reduce number of cigarettes smoked
- ❖ Given passive uptake of smoke particles, never smoke near a child

*National Commission for Breastfeeding in Germany*

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The National Commission for Breastfeeding in Germany recommends to advise smoking breastfeeding women as follows:

- Smoking should be avoided during the months of breastfeeding.
- A breastfeeding woman who does smoke should try continuously to reduce the number of cigarettes smoked.
- Given the possibility of passive uptake of smoke particles, people should never smoke near a child.

Please note smoking is not a reason for the mother to give up breastfeeding. Breastfeeding is one of the most effective ways to ensure child health and survival. WHO actively promotes breastfeeding as the best source of nourishment for infants and young children.

**<<NOTE TO USER: Include recommendations from your country.>>**

## Second-hand tobacco smoke (SHS) and children

### PUBLIC HEALTH RELEVANCE: WHAT COULD BE PREVENTED

- ❖ ↑ 70% more respiratory problems (smoking mothers)
- ❖ ↑ 38% pneumonia and hospitalization the first year of life (smoking mothers)
- ❖ ↑ 80% infant mortality (smoking during pregnancy)
- ❖ 20% of all infant deaths could be avoided if all pregnant smokers stopped by the 16th week of gestation
- ❖ Infants of mothers who smoke have almost 5 times the risk of sudden infant death syndrome versus infants of mothers who do not smoke

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Smoke released from cigarettes, cigars and pipes is composed of more than 3800 different substances. Particulate matter is 2-3 times higher in homes of smokers. Exposure may occur at home, school, child care settings, relatives' homes and others. It is important to reduce second-hand smoke and it justifies prohibiting smoke at home, schools and child care settings.

#### Refs:

- Etzel RA. Indoor air pollutants in homes and schools. *Pediatric Clinics of North America*, 2001, 48(5):1153-65.
- Wisborg K et al. Exposure to tobacco smoke in utero and the risk of stillbirth and death in the first year of life. *American Journal of Epidemiology*, 2001, 154(4):322-327.

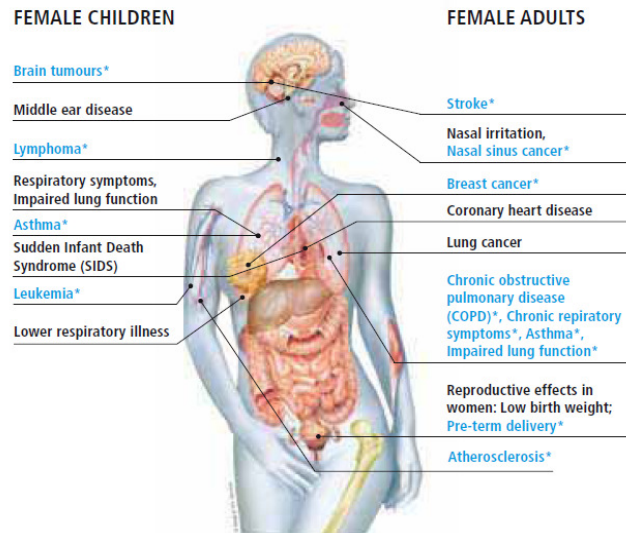
*The authors examined the association between exposure to tobacco smoke in utero and the risk of stillbirth and infant death in a cohort of 25,102 singleton children of pregnant women scheduled to deliver at Aarhus University Hospital, Aarhus, Denmark, from September 1989 to August 1996. Exposure to tobacco smoke in utero was associated with an increased risk of stillbirth (odds ratio = 2.0, 95% confidence interval: 1.4, 2.9), and infant mortality was almost doubled in children born to women who had smoked during pregnancy compared with children of nonsmokers (odds ratio = 1.8, 95% confidence interval: 1.3, 2.6). Among children of women who stopped smoking during the first trimester, stillbirth and infant mortality was comparable with that in children of women who had been nonsmokers from the beginning of pregnancy. Conclusions were not changed after adjustment in a logistic regression model for the sex of the child; parity; or maternal age, height, weight, marital status, years of education, occupational status, and alcohol and caffeine intake during pregnancy. Approximately 25% of all stillbirths and 20% of all infant deaths in a population with 30% pregnant smokers could be avoided if all pregnant smokers stopped smoking by the sixteenth week of gestation.*

<<NOTE TO USER: See module on Indoor Air Pollution for more information.>>



## Second-hand tobacco smoke (SHS) and children

### DISEASES CAUSED BY SHS - FEMALES



\* Evidence of causation: suggestive  
Evidence of causation: sufficient

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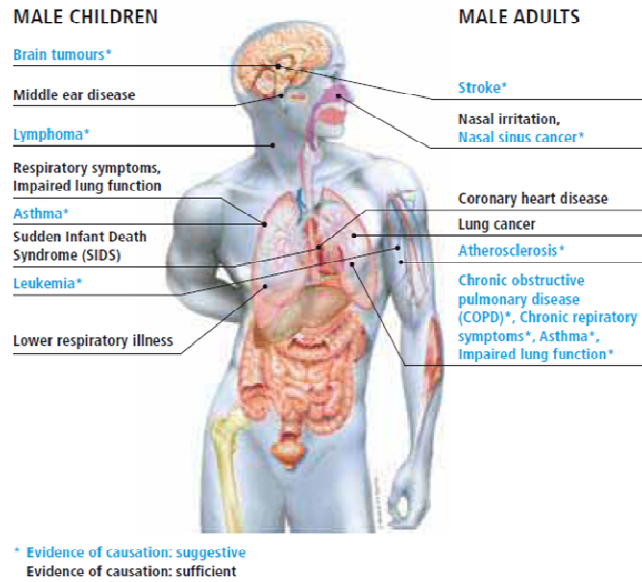
Second-hand tobacco smoke (SHS) in females has been linked to:

- Brain tumors
- Middle ear disease
- Lymphoma
- Respiratory symptoms
- Impaired lung function
- Asthma
- Sudden Infant Death Syndrome
- Leukemia
- Lower respiratory illness
- Stroke
- Nasal irritation
- Nasal sinus cancer
- Breast cancer
- Coronary heart disease
- Lung cancer
- Chronic obstructive pulmonary disease (COPD)
- Low birth weight of children
- Pre-term delivery
- Atherosclerosis

Image: WHO. WHO Report on the Global Tobacco Epidemic, 2009.

## Second-hand tobacco smoke (SHS) and children

### DISEASES CAUSED BY SHS - MALES



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Second-hand tobacco smoke (SHS) in males has been linked to:

- Brain tumors
- Middle ear disease
- Lymphoma
- Respiratory symptoms
- Impaired lung function
- Asthma
- Sudden Infant Death Syndrome
- Leukaemia
- Lower respiratory illness
- Stroke
- Nasal irritation
- Nasal sinus cancer
- Coronary heart disease
- Lung cancer
- Atherosclerosis
- Chronic obstructive pulmonary disease (COPD)

Image: WHO. WHO Report on the Global Tobacco Epidemic, 2009.

## Second-hand tobacco smoke (SHS) and children

### SECONDARY RISK OF SMOKING AT HOME: INTOXICATION

- ❖ Infants are at risk because they crawl and ingest anything, even cigarette butts
- ❖ Ingestion is highly toxic: swallowing 1 cigarette or 3 butts is dangerous
- ❖ Signs of intoxication: severe vomiting after 2-3 hours
- Call poison control centre
- ❖ Cigarette butts are present in huge quantity in the environments as normal waste. Children have access to them in areas such as playgrounds

35

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*Ref:*

•World Directory of Poison Centres. WHO, Geneva, Switzerland, 2008. Available at [www.who.int/ipcs/poisons/centre/directory/en/](http://www.who.int/ipcs/poisons/centre/directory/en/) - accessed March 2011.

## Second-hand tobacco smoke (SHS) and children

### WHAT CAN YOU DO?



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*Image: WHO. Influenza Illustration Nepal.*

## Second-hand tobacco smoke (SHS) and children

### ENVIRONMENTAL HISTORY AND DIAGNOSTIC PROCEDURES

#### ❖ History

- Taking family history in to account is essential to recognize the problem and to advise parents
- Questions on smoking habits in the family should be asked at the very first consultation (such as other questions about family, home and pets)

#### ❖ Diagnostic procedures

- No routine diagnostic procedures are necessary
- For scientific purposes, cotinine analysis of urine or serum can be used to document exposure



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<<NOTE TO USER: For more information on history-taking, see Paediatric Environmental History module. For more information on biomonitoring, see Biomarkers and human biomonitoring module>>

*Image: WHO. Anti-tobacco campaigns. Available at [www.who.int/features/2003/08/en/](http://www.who.int/features/2003/08/en/) - accessed March 2011*

*Other useful information:*

•World Directory of Poison Centers. WHO, Geneva, Switzerland, 2008. Available at [www.who.int/ipcs/poisons/centre/directory/en/](http://www.who.int/ipcs/poisons/centre/directory/en/) - accessed March 2011

## Second-hand tobacco smoke (SHS) and children

### PAEDIATRICIAN'S ROLE

- ❖ Let parents know that asthma and allergies can be triggered by second-hand tobacco smoke (SHS)
- ❖ In a study, only 8% of all parents of children with asthma indicate that the paediatrician talked with them about their smoking habits and asthma! **Be different!**
- ❖ Parents consider a clear medical opinion and positive requests to reduce smoking in general as helpful
- ❖ Doctor-hopping did not occur as a result of medical advice

Risa et al, 2000

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A German study with questionnaires (Szczepanski, 1999) showed:

- 72% of 105 interviewed parents had thought about the risks of second-hand tobacco smoke (SHS).
- 75% thought that asthma and allergies could be triggered by second-hand tobacco smoke.
- General practitioners talked to 46% of all parents about smoking, but only 15% of the paediatricians did so.
- Only 8% of all parents of children with asthma indicated that the paediatrician talked with them about their smoking habits and asthma.
- Parents considered a clear medical opinion and positive requests to reduce smoking as helpful (12%), a bit helpful (44%) and not really helpful (44%).
- Doctor-hopping did not occur as a result of medical advice.

#### Refs:

- Risa JS et al. The pediatrician's role in reducing tobacco exposure in children. *Pediatrics*, 2000, 106(5):e66.  
*Pediatricians have a unique and important role to play in the prevention and treatment of childhood and adolescent tobacco use, the protection of patients from the harmful effects of environmental tobacco smoke, and the encouragement of smoking cessation among parents. However, because recent research indicates that physician training in tobacco dependence is woefully weak and lacks a model for training, this article constructs a useful approach to this problem. ... A comprehensive model is presented for training pediatricians in the areas of reducing infant and child exposure to environmental tobacco smoke, preventing youth smoking initiation, and providing smoking cessation assistance for adolescents and parents.*
- Szczepanski, R, Hillen, P. Reduced passive smoke exposure of children – possibilities to change and their determinants. *Pneumologie*, 1999, 53(1):37-42.

## Second-hand tobacco smoke (SHS) and children

### SUPPORT PARENTS TO QUIT SMOKING!

- ❖ Use regular contacts (e.g. check-ups), mainly in the first year of life for advising breastfeeding women and/or fathers
- ❖ Main message: **Be constructive!** A positive climate makes giving advice to parents easier
- ❖ Avoid negative comments and positively support all behavioural changes, especially during pregnancy
- ❖ Preventive guidelines for paediatricians are very helpful



WHO

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Ref:

•Risa JS et al. The pediatrician's role in reducing tobacco exposure in children. *Pediatrics*, 2000, 106(5):e66.

Page 108:

#### **Strategies for reducing second-hand tobacco smoke exposure among children**

##### Initial second-hand tobacco smoke interventions

- Identify sources of second-hand tobacco smoke exposure for the child.
- Provide general information regarding the negative health effects of second-hand tobacco smoke.
- Review strategies and potential barriers for reducing the child's exposure to second-hand tobacco smoke.
- Suggest that parents discuss strategies to reduce the child's second-hand tobacco smoke exposure with other caretakers.

##### Interventions at follow-up visits

- Further identify sources of second-hand tobacco smoke exposure, reinforce possible reductions brought about by the parents, and problem-solve barriers encountered in their endeavors.
- Provide additional information about the health consequences of second-hand tobacco smoke.
- Assess parental smoking cessation efforts.

Image: WHO.

## Second-hand tobacco smoke (SHS) and children

### SUPPORT PARENTS TO QUIT SMOKING

- ❖ Advise parents to stop smoking indoors for good
  - “As your child’s paediatrician, I must advise you to stop indoor smoking for the benefit of your child”
  - “One of the best ways for you to help your child is to quit smoking”
- ❖ Advise parents to not smoke in the car
- ❖ Advise parents to not smoke indoors
- ❖ Arrange follow-up visits with the parent
  - “I’d like to have another appointment with you in a week”
  - “My nurse will be calling you next week to ask you about your experience”

40

The German Paediatric Association has guidelines for paediatricians on second-hand tobacco smoke. Some examples are shown in the slide.

*Ref:*

•Poetschke-Langer M, ed. Tobacco prevention and control (No 2): Passive smoking in Germany. German Cancer Research Institute and WHO Collaborating Centre for Tobacco Control, 2003. Available in German at [www.dkfz.de/de/tabakkontrolle/download/Publikationen/RoteReihe/Passivrauchen\\_Band2\\_4\\_Auflage.pdf](http://www.dkfz.de/de/tabakkontrolle/download/Publikationen/RoteReihe/Passivrauchen_Band2_4_Auflage.pdf) – accessed March 2011

<<NOTE TO USER: Include recommendations from your country.>>



## **Second-hand tobacco smoke (SHS) and children**

### **USE EXISTING REGULAR CHECK-UPS**

- ❖ Avoid accusation, support positive changes
- ❖ Promote healthy surroundings – clean air
- ❖ Give practical tips
- ❖ Reassure parents at follow-up appointments
- ❖ Admire small changes
- ❖ Talk to parents about their role model
- ❖ If parents regress, offer more support, such as nicotine replacement therapy

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- Avoid accusation – support every positive change, such as during pregnancy.
- During every first visit, ask about smoking habits.
- Promote healthy surroundings – clean air.
- If parents are motivated to reduce or stop smoking, support them with practical tips.
- Reassure parents at the following appointments .
- Admire small changes as well, such as smoking outdoors only.
- Talk to parents about their being a role model – smoking parents are more likely to have smoking children.
- If parents regress, offer more support, such as nicotine replacement therapy.
- If children have repeated airway problems, mainly asthma, ask again about second-hand tobacco smoke.

## **Second-hand tobacco smoke (SHS) and children**

### **EXAMPLE: U.S National Cancer Institute's Ask, Advise, Assist and Arrange model for physician-based smoking cessation**

- ❖ Ask parents about smoking at every opportunity
  - "I've noticed that your daughter has had a large number of respiratory problems. Do you or your spouse smoke cigarettes?"
  - "How many cigarettes do you smoke each day?"
- ❖ Advise parents to stop smoking
  - "As your child's paediatrician, I must advise you to stop smoking, both for your own health and that of your son"
  - "One of the best ways for you to help your daughter is to quit smoking"
  - "Are you willing to attempt to quit smoking?"

42

As an example from the United States, the 4 A Approach to Physician Based Smoking Cessation is shown in the slide. It is a very directive way of interaction.

#### *Refs:*

- Glynn TJ, Manley MW. How to Help Your Patients Stop Smoking: A National Cancer Institute Manual for Physicians. Department of Health and Human Services, Public Health Service, National Institutes of Health Washington, DC: US. *National Institutes of Health Publication*, 1995, 95-3064
- Risa JS et al. The pediatrician's role in reducing tobacco exposure in children. *Pediatrics*, 2000, 106(5):e66.

## Second-hand tobacco smoke (SHS) and children

### PREVENTION



WHO

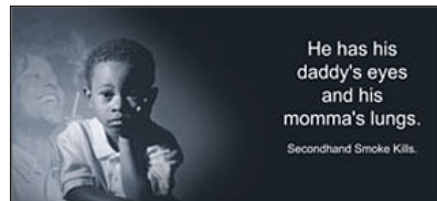
43

Image: WHO. 10 facts on second-hand smoke. Available at:  
[www.who.int/features/factfiles/tobacco/tobacco\\_facts/en/index4.html](http://www.who.int/features/factfiles/tobacco/tobacco_facts/en/index4.html) - accessed March 2011

## Second-hand tobacco smoke (SHS) and children

### PRIMARY PREVENTION

- ❖ Start very early (during and before pregnancy) ⇒ gynaecologists and midwives
- ❖ Within the family, “strengthen the parents”
- ❖ Education style, consumption style, communication and stress management have to be considered
- ❖ Use the high acceptance of the doctor/patient/parent contact to sensitize for the dangers of active and passive smoking



CDC

44

<<READ SLIDE>>

*Ref:*

•Poetschke-Langer M, ed. Tobacco prevention and control (No 2): Passive smoking in Germany. German Cancer Research Institute and WHO Collaborating Centre for Tobacco Control, 2003. Available in German at [www.dkfz.de/de/tabakkontrolle/download/Publikationen/RoteReihe/Passivrauchen\\_Band2\\_4\\_Auflage.pdf](http://www.dkfz.de/de/tabakkontrolle/download/Publikationen/RoteReihe/Passivrauchen_Band2_4_Auflage.pdf) – accessed March 2011

*Image: CDC Media Campaign Resource Center. Copyright WHO. Available at [www.who.int/features/2003/08/en/](http://www.who.int/features/2003/08/en/) - accessed March 2011.*



This graphic depicts the life-cycle of the effects of tobacco smoking on health beginning *in utero* and continuing throughout adulthood. Pregnant women will have babies with lower birth weight as well as greater chances of stillbirth.

Children with parents who smoke will be more likely to develop respiratory problems, bronchiolitis, meningitis, asthma and otitis media and are at a higher risk of fire-related injuries. Furthermore, exposure to tobacco smoke damages the respiratory epithelium and decreases the ability to combat the respiratory syncytial virus, the leading cause of hospital admissions of children under 1 year of age.

Adolescence represents a high-risk period for taking up smoking behaviour.

As adults, children of smokers have a greater likelihood of developing cancer, chronic obstructive pulmonary disease and cardiovascular diseases than children with non-smoking parents. Also, children who have a parent who smokes are more likely to smoke as adults, so the cycle continues from one generation to the next.

*Figure: Aligné A et al. Tobacco and children: An economic evaluation of the medical effects of parental smoking. Archives of Pediatrics and Adolescent Medicine, 1997, 151:652. Copyright (1997), American Medical Association. Used with permission.*

## Second-hand tobacco smoke (SHS) and children

### TEENS WHO SMOKE

- ❖ Teens who smoke are:
  - 3 times more like than non smokers to use alcohol
  - 8 times more likely to use marijuana
  - 22 times more likely to use cocaine
- ❖ On average, someone who smokes a pack a day or more of cigarettes each day lives 7 years less than someone who never smoked
- ❖ Teenage smokers suffer from shortness of breath almost 3 times as often as teens who don't smoke, and produce phlegm more than twice as often as teens who don't smoke

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#### <<READ SLIDE>>

Cigarette smoking causes heart disease and stroke. Studies have shown that early signs of these diseases can be found in teens that smoke. A teens physical performance will decrease in both performance and endurance from smoking. The resting heart rates of teens that smoke are 2-3 beats per minute faster than nonsmokers. Smoking at an early age increases the risk of lung cancer. The risk will continue to rise as long as the individual continues to smoke.

#### Refs:

- Arday DR et al. Cigarette smoking and self-reported health problems among U.S. high school seniors, 1982-1989. *American Journal of Health Promotion*, 1995, 10(2):111-116.
- Centers for Disease Control and Prevention. Preventing tobacco use among young people. A report of the Surgeon General. *MMWR*, 1994, 43.
- Lew EA, Garfinkel L. Differences in mortality and longevity by sex, smoking habits and health status. *Society of Actuaries Transactions*, 1987, 39.
- WHO. Health effects of smoking among young people. Available at [www.who.int/tobacco/research/youth/health\\_effects/en/](http://www.who.int/tobacco/research/youth/health_effects/en/) - accessed March 2011

## Second-hand tobacco smoke (SHS) and children

### PREVENT TEENAGERS FROM STARTING TO SMOKE

- ❖ Primary prevention: **Do not start to smoke**
- ❖ Secondary prevention: Smoking teenagers need support and advice to stop smoking
- ❖ Special projects for target groups (children and teenagers) e.g.:
  - In Germany the programme “Just Be Smoke-free” for teenagers and adolescents is promoted by the German Professional Association of Children’s and Young People’s Physicians and the German Medical Association ([www.justbesmokefree.de](http://www.justbesmokefree.de))



WHO

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<<READ SLIDE>>

<<NOTE TO USER: use an example of teenage smoking prevention programs from your particular region.>>

Image: WHO

## Second-hand tobacco smoke (SHS) and children

### EFFICIENCY OF INTERVENTIONS STUDY OF PREGNANT WOMEN

- ❖ Anti-smoking counseling for pregnant women (maternity centers in Lodz)
- ❖ 149 current smokers and 56 spontaneous quitters randomized into the smoking cessation intervention
- ❖ 144 current smokers and 37 spontaneous quitters control group
- ❖ Intervention program included 4 midwife visits during pregnancy and one after delivery
- ❖ Control units received standard written information about the health risk from maternal smoking to the fetus
- ❖ Collection of data on smoking relapse one year postpartum.



UNICEF / Marta Ramoneda

Polanska, Hanke, 2006

48

#### <<READ SLIDE>>

##### Ref:

•Polanska K, Hanke W. Effectiveness of smoking cessation interventions for pregnant women - meta-analyses of randomized trials and description of the study performed in Poland. *Ginekologia Polska*, 2006, 77(6):422-8.

**OBJECTIVES:** The aim of the study was to evaluate the effectiveness of smoking cessation interventions for pregnant women. **DESIGN:** The study including meta-analyses of randomized trials and description of the study performed in Poland. **MATERIALS AND METHODS:** The anti-smoking counselling for pregnant women was performed in the maternity centers in Lodz. This study consisted of two stages. At the first stage which was performed between 1 December 2000 and 31 December 2001, 149 current smokers and 56 spontaneous quitters were randomized into the smoking cessation intervention and 144 current smokers and 37 spontaneous quitters were included into the control group. The intervention program included four midwife visits during pregnancy and one after delivery. The control units received standard written information about the health risk from maternal smoking to the fetus. The second stage of the study included collection of data on smoking relapse one year postpartum. **RESULTS:** The chance of quitting smoking by the women who agree to participate in the program was significantly higher in the intervention group than in the control group (OR=5.8;  $p<0.001$ ). The chance to maintain smoking abstinence one year after delivery was four times higher in intervention than control group (3.7,  $p=0.03$ ). **CONCLUSIONS:** The midwife-assisted smoking cessation intervention performed in Lodz region seems to be an effective tool to help pregnant smoker make a decision to quit smoking and maintain smoking abstinence after delivery.

Image: UNICEF / Marta Ramoneda – available at [www.who.int/reproductivehealth/topics/maternal\\_perinatal/en/index.html](http://www.who.int/reproductivehealth/topics/maternal_perinatal/en/index.html) - accessed March 2011



## Second-hand tobacco smoke (SHS) and children

### EFFICIENCY OF INTERVENTIONS STUDY OF PREGNANT WOMEN

- ❖ Smoking cessation was significantly higher in the intervention group than in the control group (odds ratio=5.8;  $p<0.001$ )
- ❖ Smoking abstinence one year after delivery was four times higher in intervention than control group (odds ratio=3.7;  $p=0.03$ )



WHO

Ref: Polanska K, Hanke W.

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#### Ref:

•Polanska K, Hanke W. Effectiveness of smoking cessation interventions for pregnant women - meta-analyses of randomized trials and description of the study performed in Poland. *Ginekologia Polska*, 2006, 77(6):422-8.

**OBJECTIVES:** The aim of the study was to evaluate the effectiveness of smoking cessation interventions for pregnant women. **DESIGN:** The study including meta-analyses of randomized trials and description of the study performed in Poland. **MATERIALS AND METHODS:** The anti-smoking counselling for pregnant women was performed in the maternity centers in Lodz. This study consisted of two stages. At the first stage which was performed between 1 December 2000 and 31 December 2001, 149 current smokers and 56 spontaneous quitters were randomized into the smoking cessation intervention and 144 current smokers and 37 spontaneous quitters were included into the control group. The intervention program included four midwife visits during pregnancy and one after delivery. The control units received standard written information about the health risk from maternal smoking to the fetus. The second stage of the study included collection of data on smoking relapse one year postpartum. **RESULTS:** The chance of quitting smoking by the women who agree to participate in the program was significantly higher in the intervention group than in the control group ( $OR=5.8$ ;  $p<0.001$ ). The chance to maintain smoking abstinence one year after delivery was four times higher in intervention than control group (3.7,  $p=0.03$ ). **CONCLUSIONS:** The midwife-assisted smoking cessation intervention performed in Lodz region seems to be an effective tool to help pregnant smoker make a decision to quit smoking and maintain smoking abstinence after delivery.

Image: WHO. Making Pregnancy Safer. Available at [www.who.int/making\\_pregnancy\\_safer/topics/mdg/en/index.html](http://www.who.int/making_pregnancy_safer/topics/mdg/en/index.html) - accessed March 2011

## Second-hand tobacco smoke (SHS) and children

### WHO FRAMEWORK CONVENTION ON TOBACCO CONTROL

- ❖ Price and tax measures to reduce the demand for tobacco
- ❖ Protection from exposure to smoke - smoke free environments
- ❖ Packaging and labeling of tobacco products
- ❖ Education, communication, training and public awareness
- ❖ Tobacco advertising, promotion and sponsorship
- ❖ Reduction measures concerning tobacco dependence and cessation
- ❖ Sales to and by minors



WHO

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The World Health Organization Framework Convention on Tobacco Control, developed in response to the globalization of the tobacco epidemic, is the first treaty negotiated by the Member States of the World Health Organization using their powers under the organization's constitution. It is the pre-eminent global tobacco control instrument, which contains legally binding obligations for its parties, sets the baseline for reducing both demand for and supply of tobacco, and provides a comprehensive direction for tobacco control policy at all levels.

*Ref:*

•WHO. WHO report on the global tobacco epidemic, 2009. Available at [whqlibdoc.who.int/publications/2009/9789241563918\\_eng\\_full.pdf](http://whqlibdoc.who.int/publications/2009/9789241563918_eng_full.pdf) – accessed March 2011

*Image: WHO. WHO Framework Convention on Tobacco Control.*

## Second-hand tobacco smoke (SHS) and children

### WHO'S TOBACCO FREE INITIATIVE

- ❖ To reduce disease and death caused by tobacco
- ❖ To protect present and future generations consequences of tobacco consumption and exposure to tobacco smoke
- ❖ To provide global policy leadership
- ❖ To encourage mobilization at all levels of society
- ❖ To promote the WHO Framework Convention on Tobacco Control
- ❖ To encourage countries to adhere to its principles

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#### **The World Health Organization's response to the tobacco epidemic**

*The Tobacco Free Initiative was established in July 1998 to focus international attention, resources and action on the global tobacco epidemic.*

*The Tobacco Free Initiative's objective is to reduce the global burden of disease and death caused by tobacco, thereby protecting present and future generations from the devastating health, social, environmental and economic consequences of tobacco consumption and exposure to tobacco smoke. To accomplish its mission, Tobacco Free Initiative : provides global policy leadership; encourages mobilization at all levels of society; and promotes the WHO Framework Convention on Tobacco Control, encourages countries to adhere to its principles, and supports them in their efforts to implement tobacco control measures based on its provisions.*

#### **Tobacco Free Initiative global structure**

*Tobacco Free Initiative is part of the Noncommunicable Diseases and Mental Health cluster at WHO headquarters in Geneva. Regional advisers for tobacco control are based in WHO's regional offices for Africa, the Americas, the Eastern Mediterranean, Europe, South-East Asia and the Western Pacific. Tobacco Free Initiative – WHO headquarters works closely with its regional advisers to plan and implement all activities. Its regional advisers, in turn, collaborate with WHO's country representatives and liaison officers to facilitate tobacco control activities at regional and country level. Most of Tobacco Free Initiative's major activities are coordinated by its regional offices and decentralized to country level.*

#### **Contact information**

Tobacco Free Initiative  
WHO/Noncommunicable Diseases and Mental Health  
20 Avenue Appia  
1211 Geneva 27  
Switzerland  
Telephone: +41 22 791 4426  
Fax: + 41 22 791 4832  
E-mail: [tfi@who.int](mailto:tfi@who.int)

#### **Related links**

-[Tobacco Free Initiative home page](http://www.who.int/tobacco/en/index.html) available at [www.who.int/tobacco/en/index.html](http://www.who.int/tobacco/en/index.html) - accessed March 2011

-[WHO tobacco sites](http://www.who.int/topics/tobacco/en/index.html) at [www.who.int/topics/tobacco/en/index.html](http://www.who.int/topics/tobacco/en/index.html) - accessed March 2011

#### **Ref:**

•WHO. Tobacco Free Initiative: World No Tobacco Day. Available at [www.who.int/tobacco/en/index.html](http://www.who.int/tobacco/en/index.html) – accessed March 2011

## Second-hand tobacco smoke (SHS) and children

### WORLD NO TOBACCO DAY



WHO

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The WHO Framework Convention on Tobacco Control (WHO FCTC) is the world's foremost tobacco control instrument. Since 2005, it is one of the most rapidly and widely embraced treaties in the history of the United Nations, with more than 170 Parties. An evidence-based treaty, it reaffirms the right of all people to the highest standard of health and provides new legal dimensions for cooperation in tobacco control. Tobacco use is the leading preventable cause of death. This year, more than 5 million people will die from tobacco-related heart attack, stroke, cancer, lung ailment or other disease. This does not include the more than 600,000 people – more than a quarter of them children – who will die from exposure to second-hand smoke. The annual death toll from the global epidemic of tobacco use could rise to 8 million by 2030.

The WHO FCTC confers legal obligations on the countries that have formally acceded to it.

These obligations include:

- protect public health policies from commercial and other vested interests of the tobacco industry;
- adopt price and tax measures to reduce the demand for tobacco;
- protect people from exposure to tobacco smoke;
- regulate the contents of tobacco products;
- regulate tobacco product disclosures;
- regulate the packaging and labeling of tobacco products;
- warn people about the dangers of tobacco;
- ban tobacco advertising, promotion and sponsorship;
- offer assistance to end their addiction to tobacco;
- control the illicit trade in tobacco products;
- ban sales by and to minors;
- support economically viable alternative to tobacco growing.

Ref:

• WHO. World No Tobacco Day. FCTC. Available at [www.who.int/tobacco/wntd/2011/announcement/en/index.html](http://www.who.int/tobacco/wntd/2011/announcement/en/index.html) – accessed March 2011

Image: WHO. World No Tobacco Day. Available at [www.who.int/tobacco/wntd/2011/announcement/en/index.html](http://www.who.int/tobacco/wntd/2011/announcement/en/index.html) – accessed March 2011

## Second-hand tobacco smoke (SHS) and children

### ESTIMATED REDUCTION IN SMOKING-RELATED DEATHS IF GLOBAL SMOKING PREVALENCE IS REDUCED FROM 25% TO 20%

	Population 2006 (millions)	Millions of smokers	Millions of smokers to be reduced	Millions of prevented premature deaths
<b>At the moment</b>				
Adults (age ≥ 18 years)	4357	1089	218	73
<b>Future</b>				
Children (age 0-17 years)	2122	531	106	35
Unborn (2007-2030)	3020	755	151	50
Minimum of millions of deaths prevented in the century				158

Based on: Frieden TR, Bloomberg MR

53

The current global prevalence of smoking in adults is estimated at approximately 25%. Prevalence has been reduced to 20% in Australia, Brazil, Canada, South Africa, and Sweden as a result of effective policies being implemented. If the absolute smoking prevalence is reduced by 5% by 2020 globally, there will be at least 100 million fewer tobacco-related premature deaths in people alive today. Additionally, another 50 million deaths would be prevented in infants born between now and 2030.

#### Ref:

•Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761.

Table based on: Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761. Population estimate source: US Census Bureau, International Database. Copyright notice: Information that is created by or for the US government is within the public domain.

## Second-hand tobacco smoke (SHS) and children

### ADDRESSING TOBACCO CONTROL - PRICE

**Studies show that by increasing taxes to tobacco and preventing smuggling:**

- ❖ Tobacco use is reduced.
- ❖ Young people and children with lower incomes can not afford tobacco products
- ❖ Public opinion is usually favorable
- ❖ Workers of the tobacco industry may need to be relocated

**The most effective way to reduce tobacco use**

*Frieden, Bloomberg, 2007*

54

Effective strategies to reduce smoking have been developed and tested, they now just need to be implemented globally. Methods to reduce tobacco use include addressing price, image, exposure, cessation experience, and monitoring.

The most effective way to reduce tobacco use is through taxation. In 2002 a comprehensive tobacco-control program was implemented. A tax increase raised the price of cigarettes by 32% to \$7 US dollars per pack. In two years there were 200,000 fewer smokers as a result of this and the other interventions implemented as a part of the program.

*Ref:*

•Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761.

•Jha P et al. Tobacco addiction. In: *Disease control priorities in developing countries, 2<sup>nd</sup> ed.* Jamison DT et al, eds. New York, Oxford University Press and Washington DC World Bank, 2006, 869-85.

## Second-hand tobacco smoke (SHS) and children

### ADDRESSING TOBACCO CONTROL - IMAGE

#### Studies show that by banning tobacco advertising (direct and indirect):

- ❖ The industry is limited in showing the positive image of tobacco
- ❖ Prevent industry from ability to counteract taxation with interventions that lower prices (eg., coupons, "2 for 1" sales)

#### Also:

- Industry undermines bans by using point-of-sale, promotions, direct mail, sponsorship, product displays, product placement, and other methods
- Tobacco companies should not be allowed tax deductions for marketing and promotion expenses

*Frieden, Bloomberg, 2007*

55

To stop the epidemic of tobacco the image of smoking and tobacco use must be changed. Globally tens of billions of dollars are spent annually on marketing expenditures by the tobacco industry. The framework convention on tobacco control has called for advertising bans that can reduce smoking rates. To be effective these bans must prevent things like price discounts and free samples. Countries must modify laws which to prevent companies from being able to deduct marketing and promotion as business expenses.

#### *Ref:*

•Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761.

## Second-hand tobacco smoke (SHS) and children

### ADDRESSING TOBACCO CONTROL - IMAGE

#### **Studies show that impacting and sustainable campaigns work and should:**

emphasize harmful effects of smoking and second-hand tobacco smoke (SHS); reveal industry tactics; benefits of and potential stop campaign; human face of suffering caused by tobacco; decline in smoking and reduction in exposure to tobacco smoke

**Also:** Advertisement against tobacco supported by tobacco industry shown to be ineffective or to increase tobacco use

*Frieden, Bloomberg, 2007*

56

Use of hard-hitting antitobacco campaigns has been shown to be effective in California and Massachusetts of the U.S. In 1999 the US Centers for Disease Control and Prevention recommended that tobacco-control programs spend annually at least \$1 per person for antitobacco advertising. If this were done globally 6000 million dollars would be spent annually. The tobacco companies in the U.S spend \$50 per person every year on advertising. This stresses the importance of implementing restrictions on advertising and promotion.

#### *Refs:*

- Biener L, Harris JE, Hamilton W. Impact of the Massachusetts tobacco control program: population based trend analysis. *British Medical Journal*, 2000, 321(7257):351-54.
- Emery S et al. Televised state-sponsored antitobacco advertising and youth smoking beliefs and behavior in the United States, 1999-2000. *Arch Pediatr Adolesc Med*, 2005, 159(7):639-45.
- Federal Trade Commission. Federal Trade Commission cigarette report for 2004 and 2005. Washington: Federal Trade Commission, 2007.
- Fichtenberg CM, Glantz SA. Association of the California Tobacco Control Program with declines in cigarette consumption and mortality from heart disease. *New England Journal of Medicine*, 2000, 343(24):1772-77.
- Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761.



## Second-hand tobacco smoke (SHS) and children

### ADDRESSING TOBACCO CONTROL - EXPOSURE

**Studies show that by establishing smoke-free public places:**

- ❖ Protect public from second-hand tobacco smoke (SHS)
- ❖ Encourages smokers to quit
- ❖ Increases awareness of the health risks of SHS
- ❖ Encourages smoke-free homes, protecting children & family members, and helping smokers quit
- ❖ Gives a negative image to smoking

**Also note:**

- ❖ Laws allowing smoking in parts of workplaces are not effective
- ❖ Smoke-free laws are popular once implemented
- ❖ Smoke-free laws cause no or a slight increase in revenue for restaurants and bars

*Frieden, Bloomberg, 2007*

57

Implementation of smoke-free policies in public places has many benefits. It protects the public from the pollution caused by tobacco, increases the odds that others will quit, it results in an increased awareness of the health threats from exposure to pollution caused by tobacco, and can play an important role in helping to change the image of smoking. When smoke-free laws are established and enforced, it encourages families to make their homes smoke-free, which protects children, other family members, and assists smokers that want to quit.

*Refs:*

- Borland R, et al. Determinants and consequences of smoke-free homes: findings from the International Tobacco Control (ITC) four country survey. *Tobacco Control*, 2006, 15(3):42-50.
- Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761.

## Second-hand tobacco smoke (SHS) and children

### ADDRESSING TOBACCO CONTROL – CESSATION SERVICES

#### **Studies show that by making effective smoking treatment available:**

- ❖ Almost doubles smokers' chances of stopping permanently
- ❖ Facilitates policy change
- ❖ Engages health professionals in antitobacco efforts

#### **Also note:**

- ❖ Combination of medication & counseling works best
- ❖ Greater cost effectiveness & health effect than most clinical interventions
- ❖ Ethically important to use some taxes smokers pay to help individuals that want to quit

*Frieden, Bloomberg, 2007*

58

Tobacco dependence typically tends to be undertreated. It is important for cessation services to be provided by the health care sector, which should be a smoke-free system. Receiving advice from a physician has shown to be an effective cessation method, but is not common practice. Over the counter products that provide nicotine replacement are also important in cessation. Counseling along with medications should be provided for people wanting to quit smoking.

#### *Refs:*

- Fiore MC et al. Treating tobacco use and dependence. Clinical practice guideline. U.S. Department of Health and Human Services. Public Health Service, 2000.
- Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761.

## Second-hand tobacco smoke (SHS) and children

### ADDRESSING TOBACCO CONTROL - MONITORING

#### Studies show that by implementing programs and monitoring effectiveness:

- ❖ Interventions can be controlled as prevalence and patterns of tobacco use are known and followed
- ❖ Effect of taxation, smuggling prevention, image, exposure, cessation interventions can be monitored

#### Also note:

- ❖ Standardized, bio-marker-validated definitions of smoking status needed

*Frieden, Bloomberg, 2007*

59

Surveillance mechanisms must be put in place to properly assist program implementation and to monitor results. Such mechanisms will allow for assessments on taxation, smuggling, image, knowledge, about tobacco, cessation experience, and other areas. There must be a standardization of biomarker-validation definitions of smoking status.

#### *Ref:*

•Frieden TR, Bloomberg MR. How to prevent 100 million deaths from tobacco. *Lancet*, 2007, 369(9574):1758-761.

## Second-hand tobacco smoke (SHS) and children

### HEALTH AND ENVIRONMENT PROFESSIONALS PLAY A KEY ROLE

- ❖ Health promotion in general has to be at least as attractive for physicians as early diagnosis and treatment of diseases
- ❖ But changes are usually only possible in small steps
- ❖ Not only the smoker but also a hesitating physician or insecure outpatient or hospital staff have to be respected and then motivated and trained

Change the framework conditions:

- Stop the promotion of tobacco products
- Increase the price of tobacco products
- Restrict sale of cigarettes to teenagers
- Protect non-smokers



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Suggested pediatric interventions for the prevention of tobacco use include:

#### Office and setting factors

- Model a tobacco-free lifestyle
- Provide a tobacco-free office environment
- Place anti-tobacco messages (eg, posters, pamphlets) in office
- Seek continuing medical education on tobacco-use prevention
- Encourage parents to create a tobacco-free home environment

#### Countering social influences

- Reinforce abstinence from all tobacco products
- Teach about the immediate negative consequences of tobacco use
- Provide counter advertising education
- Teach tobacco refusal techniques

#### Community-based interventions

- Participate in organizations attempting to reduce tobacco use
- Disseminate tobacco-use prevention messages in local media
- Participate in school-based prevention programs

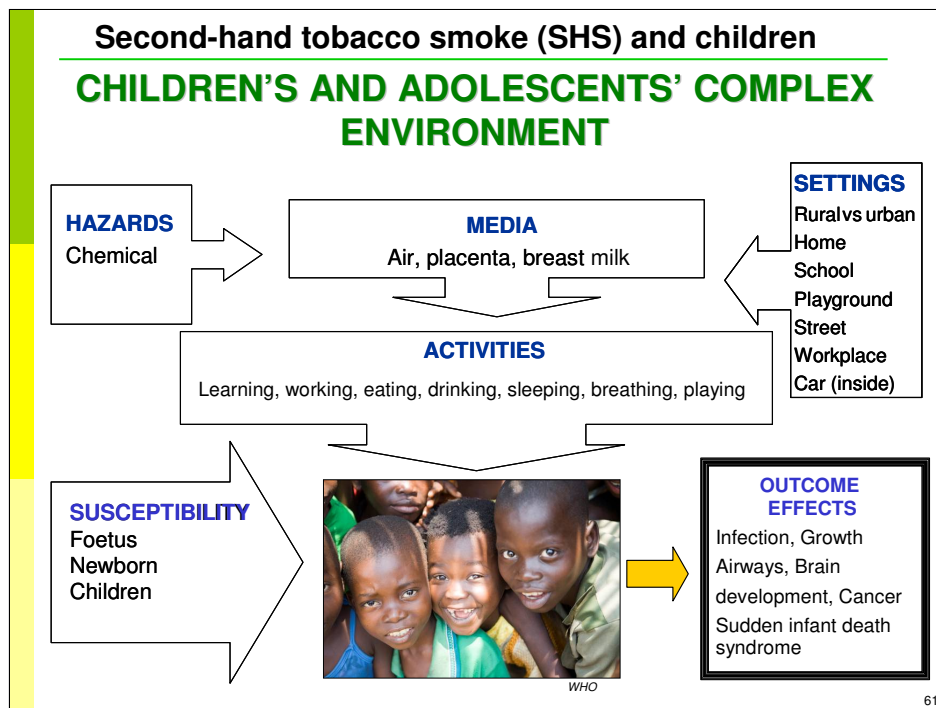
#### Policy interventions

- Provide expert testimony to legislative bodies
- Lobby legislators to support tobacco-use prevention efforts
- Support initiatives to increase excise taxes on tobacco products
- Encourage enforcement of laws designed to prevent tobacco sales to minors

#### *Ref:*

- Risa JS et al. The pediatrician's role in reducing tobacco exposure in children. *Pediatrics*, 2000, 106(5):e66.

*Image: WHO*



In this summary slide, we see the complexity of the issues related to children's environmental health including SHS. Hazards (physical, chemical, biological – in many cases favored by social factors) are introduced into environmental media (water, air, food, soil objects, toys) with variable efficiency in different settings (urban and rural: home, school, field, playground, street, workplace). A child's activities brings him into contact with these hazards.

**<<READ SLIDE>>**

Depending upon the individual susceptibility of the child based upon age, general health and social supports, the exposure may cause harm from subtle changes in function to death.

Children's environmental health is the field which synthesizes these complexities and attempts to make fundamental changes to improve children's environments and prevent environmental illnesses.

*Image: WHO. Ebola in Democratic Republic of the Congo.*

*SHS: Second-hand smoke*

## Second-hand tobacco smoke (SHS) and children

### CRITICAL ROLE OF HEALTH AND ENVIRONMENT PROFESSIONALS

- ❖ Diagnose and treat
- ❖ Publish and research
- ❖ Sentinel cases
- ❖ Community-based interventions
- ❖ Educate
  - Patients and families
  - Colleagues and students
- ❖ Advocate
- ❖ Provide a role model



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Health and environment professionals have a critical role to play in maintaining and stimulating changes that will restore and protect children's environmental health.

While the human genome project is very important and scientifically exciting, we all know that genes express themselves within an environment and understanding gene-environment interactions is what will keep our children healthy. So, as we look to our political and personal lives to support sustainable development, we can look to our practices for ways to enhance the environmental health of our patients.

All of us can do something.

At the one on one patient level we can include environmental etiologies in our differential diagnoses and in our preventive advice. We can be dissatisfied with the diagnosis of "idiopathic" and look hard for potential environmental causes of disease and disability.

We can publish sentinel cases and develop and write up community based interventions.

We can educate our patients, families, colleagues and students didactically.

Finally, we must all become vigorous advocates for the environmental health of our children and future generations. It's not enough to be an informed citizen, we need to write letters and articles, testify in hearings, approach our elected officials with education and positive messages, avoiding "scares" and "alarmism" but providing the evidence for action and clear remedial/preventive proposals.

And, we must all recognize that as professionals with understanding of both health and the environment, we are powerful role models. Our choices will be noticed: they should be thoughtful and sustainable.

*Image: WHO. Please don't smoke in our home. Available at [www.who.int/features/2003/en/08\\_galleryb\\_7\\_en.html](http://www.who.int/features/2003/en/08_galleryb_7_en.html) - accessed March 2011*

## Second-hand tobacco smoke (SHS) and children

**WE HOLD OUR FUTURE IN OUR HANDS  
AND IT IS OUR CHILDREN**



*Poster contest by HRIDAY with support from the WHO Regional Office for South-East Asia*

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We end with this beautiful reminder to us from a child in India. We must recognize the risks to our children and assume our responsibilities of preventing them, because we hold our future in our hands—and it is our children.

Thank you.

## **Second-hand tobacco smoke (SHS) and children**

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## Second-hand tobacco smoke (SHS) and children

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